ACC.12
61st Annual Scientific Session & Expo
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E937
JACC March 27, 2012
Volume 59, Issue 13

Heart Failure

CORRELATIONS BETWEEN RECOVERY KINETICS AND SKELETAL MUSCLE GENE EXPRESSION IN SYSTOLIC HEART FAILURE

ACC Moderated Poster Contributions
McCormick Place South, Hall A
Monday, March 26, 2012, 9:30 a.m.-10:30 a.m.

Session Title: Delineating Exercise-related and Hemodynamic Abnormalities in Chronic Heart Failure
Abstract Category: 14. Heart Failure: Clinical
Presentation Number: 1225-524

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Introduction: Recovery kinetics after exercise in systolic heart failure (HF) are clinically relevant, but not well characterized. We examined whether expression of genes associated with muscle atrophy correlated with oxygen consumption (VO2) during recovery from exercise, and whether these relationships are altered in HF.

Methods: Cardiopulmonary exercise testing was used to compare VO2 (from peak to 1 minute [Δmin1VO2] and to 2 minutes [Δmin2VO2]) in systolic HF patients and age matched controls. Real-time polymerase chain reaction was also used to assess pertinent gene expression in skeletal muscle (atrogin-1, muscle ring finger 1, forkhead transcription factor-1 and -3, peroxisome-proliferator-activated receptor-B co-activator-1alpha, insulin-like growth factor 1, and insulin-like growth factor binding protein-5) in the same population from a vastus lateralis biopsy.

Results: 70 male patients were studied (31 HF and 39 controls). Both Δmin1VO2 (2.43±2.3 vs. 7.3±5 mlO2·kg-1·min-1; p<0.0001) and Δmin2VO2 (7.8±4 vs. 15.2±7.3 mlO2·kg-1·min-1; p<0.0001) were lower in HF. Genes induced in atrophying muscle negatively correlated with 2-minute recovery kinetics in controls, meanwhile this association was not observed in HF (Table). Genes suppressed in atrophying muscle correlated with recovery kinetics in HF but not controls.

Conclusions: Recovery from exercise is associated with divergent programs of skeletal muscle adaptation in the healthy state compared to HF.

Table: Correlations between relative gene expression and recovery kinetics

	Δmin1VO2		Δmin2VO2	
	HF	Controls	HF	Controls
Genes induced in atrophying muscle				
Atrogin-1	0.33	-0.33	0.41	-0.48*
Muscle ring finger -1	-0.16	-0.32	-0.09	-0.44*
Forkhead transcription factor -1	-0.21	-0.32	-0.09	-0.56**
Forkhead transcription factor -3	-0.13	-0.31	0.01	-0.31**
Genes suppressed in atrophying muscle				
Peroxisome-proliferator-activated receptor-γ co-activator-1alpha	0.49*	-0.21	0.59**	-0.23
Insulin-like growth factor 1	0.31	-0.09	0.48*	-0.06
Insulin-like growth factor binding protein-5	0.41	-0.15	0.69***	-0.30

*p<0.05, **p<0.01, ***p<0.001